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Japan Report

(FOUO 8/81)

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MILITARY

OSAKA EXPORTER SHIPPED GUN BARRELS TO ROK

Tokyo DAILY YOMIURI in English 4 Jan 81 p 1

[Text] Osaka--An Osaka steel exporter has been found to have shipped \$750 million worth of "gun barrels and parts" for artillery to South Korea and is suspected of violating the Export Trade Control Ordinance, which bans shipments of arms from Japan to foreign countries, The Yomiuri Shimbun has learned.

The case is the largest such ever discovered in Japan.

In connection with the exports, Hotta Hagane (steel) Company of Nishi-Honmachi, Nishi-ku, Osaka, has been indicted by the Kobe District Public Prosecutors Office on charges of violating the Foreign Exchange and Foreign Trade Control Law for unlawful payments to a vice-president of a Korean firm.

The Yomiuri Shimbun learned of the exports while investigating dubious relations between Hotta Hagane and Daikan Heavy Industries (Taehan Chuggi) Company in Seoul, one of South Korea's leading arms manufacturers.

A total of about 3,000 items, comprising gun barrels for artillery and mortars and their parts, were allegedly shipped between June 1976 and 1979. Some gun barrels were reportedly dubbed "Tube 1111" or "19B."

Hotta Hagane, which specializes in special steel and stainless steel, closed a contract with the Korean firm in 1975 between Yuichi Maekawa, 51-year old managing director of Hotta Hagane, and Kim Ki Tei, president of Daikan Heavy Industries Company.

Under the agreement, the Korean company allegedly padded bills in the form of letters of credit (LC), and Hotta kept aside the difference to pay Kim later when he visited Japan.

Maeda reportedly handed Kim a total of \$45,500,000—\$20,500,000 in 16 checks issued by the Osaka-Nishi branch of the Mitsubishi Bank and \$25 million in four checks issued by the Kujo branch of the Hyakujushi Bank—in an Osaka hotel when Kim visited Japan on April 26, 1978.

This violated Item 1, Article 27 of the Foreign Exchange and Foreign Trade Control Law, which either bans or limits the payment of money to nonresident foreigners.

The Yomiuri Shimbun closely checked the contents of the deals between two companies in view of the exorbitant kickbacks and the size of Hotta Hagane, regarded as either a small or a medium-sized firm.

Employees of the Japanese company and dealers concerned have disclosed that Maekawa visited South Korea in the spring of 1976, and was asked by Kim to ship gun barrels and parts.

At the time, South Korea felt it had to find ways to procure arms from countries other than the US following President Carter's announcement that the US would pull out troops from South Korea.

After Maekawa agreed to supply gun barrels and parts, the Korean firm allegedly asked him to manufacture them in accordance with "mill specifications" of the US Defense Department which specify materials to be used, manufacturing methods and inspection systems.

The Korean firm also said to have supplied Hotta Hagane with design drawings for the gun barrels.

Meanwhile, the Japanese company reportedly learned that the mill specifications (in English) were available at Nippon Kikaku Kyokai (standards association), and based on the specifications, ordered gun barrels and their parts from Japanese manufacturers.

However, one manufacturer refused to produce them on the grounds that they were "arms" under the provisions of the Export Trade Control Ordinance.

There are several persons concerned with the deal who said that they think that the products were gun barrels.

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Maekawa is known to have sent a letter to Kim stating that there were views in Japan that the shipment of parts to be used by the South Korean defense industry violated the Japanese law. "However, I am aware that Japan's peace is guaranteed by South Korean defense capability, and thus the deal is lawful," he is quoted as saying.

Hotta Hagane, with paid capital of ¥20 million, has been dealing also in bolts and nuts and valves with annual proceeds averaging about ¥3.2 billion a year, of which 85 percent is from local clients and the remaining 15 percent from overseas customers. The company has a total of about 1,000 clients both in Japan and abroad.

Meanwhile, Yoshihiro Sakamoto, chief of the Aircraft and Arms Section of the International Trade and Industry Ministry (MITI) admitted that his section received an inquiry from the Kobe District Public Prosecutors Office about the deal.

He said that MITI thought that the alleged "gun barrels" were semi-finished products because they had no rifling inside them.

However, MITI had to carefully examine the case to determine if the products were arms under the provisions of the Export Trade Control Ordinance, he said.

This arises from the fact that even parts for arms are regarded as "arms" under the Japanese Government's three-point policy against the export of arms, he pointed out.

"We have to closely examine the products and to listen to views of specialists before deciding," he added.

Meanwhile, Akira Hotta,

52, president of Hotta Hagane, said his company had supplied the Korean machine firm with its steel products but added he had no idea what they were intended for.

He also said he has already paid fines after being indicted on charges of violating the Foreign Exchange and Trade Control Law.

Govt, Opposition Gird For Probe

Taking a serious view of exports to South Korea of semfinished artillery parts, the government Monday will start full-scale investigations into Hotta Hagane (steel) Company, exporter of the semfinished arms in question, and others concerned.

Government sources pointed out a possibility that the International Trade and Industry Ministry (MITI) may charge the company with violating the Export Trade Control Ordinance if such violation is established in the course of investigations.

Under the ordinance, exports of arms require the approval of the MITI minister. Such items are banned from export to communist-bloc countries, countries engaged in hostilities or those having a possibility of becoming involved in armed conflict and areas to which exports of arms are banned by UN resolution.

This three-point restrictive policy on exports of arms have been maintained by the Japanese Government since the Eisaku Sato administration in 1970.

Leaders of opposition parties Saturday expressed their intention of interpellating the government on the matter in the ordinary Diet to be resumed on January 25.

They said their parties would conduct investigations into the matter, respectively.

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MILITARY

EXPORTED ARMS: MAKER IDENTIFIED

Tokyo DAILY YOMIURI in English 5 Jan 81 p 2

[Text] *Sanyo Tokushuko (special steel) Company of Himeji, Hyogo-ken, manufactured "gun barrels and parts" for artillery shipped to South Korea by an Osaka steel exporter, a Yomiuri Shimbun investigation revealed Sunday.*

The company with paid capital of ¥4.3 billion went bankrupt in 1965, but has been rehabilitated, and is now listed in the Second Section of the Osaka Stock Exchange.

It started manufacturing gun barrels, including those of 92-millimeter caliber, which were dubbed "Tube 1111" and were 2,790 millimeters long, and those of 135-millimeter caliber, also dubbed Tube 19B and 4,100 millimeters long, in 1976 as the first consignment of orders from Hotta Hagane, an Osaka exporter of special steel.

This was based on a contract concluded between the Osaka firm and Daikan Juki of Seoul around June the same year, which was reportedly on the export of "arms" to South Korea.

Under the contract, whose details were fixed between Yuichi Maekawa, managing director of Hotta Hagane, and Kim Ki Tei, vice-president of the Korean firm, the "arms" were to be shipped in four consignments between 1976 and 1979 following the opening of letters of

credit (LC) by the Korean company.

The first consignment comprising about 240 items, which included 30 Tube 1111s and 10 Tube 19Bs, was shipped by the end of 1976.

These and other gun barrels were regarded as semifinished products because they had no rifling.

The second consignment comprising 200 items, including 120 gun barrels, was shipped in the latter half of 1977.

Kozo Seto, a director in charge of technology of Sanyo Tokushuko, told The Yomiuri Shimbun that he did not ask what these items were intended for because his firm was to supply "basic materials." The company agreed to manufacture them as it was suffering from a business slump and in the midst of being rehabilitated, he also remarked.

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MILITARY

MITI BEGINS PROBE INTO ARMS EXPORT TO SEOUL

Tokyo DAILY YOMIURI in English 6 Jan 81 p 2

[Text] *The International Trade and Industry Ministry (MITI), shocked at reports that a sizeable amount of "arms" has been shipped from Japan to South Korea, Monday afternoon summoned executives of two leading special steelmakers and inquired about the alleged export of arms.*

Before the meetings with the executives of Kanto Tokushu Seiko (special steelworks), headquartered in Fujisawa, Kanagawa-ken, and Sanyo Tokushuko (special steel) Company of Himeji, Hyogo-ken, MITI officials Monday morning reported the case to MITI Minister Rokusuke Tanaka and later discussed what action they should take.

The discussions centered on whether or not the articles exported by Hotta Hagane (an exporter of special steel) of Osaka to Daido Juki Kogyo (heavy machine industries) of Seoul were "arms" under the provisions of the Arms Manufacturing Law. They planned to meet with officials of Hotta Hagane Tuesday.

The officials also agreed to examine if the same articles were "parts for arms" whose export is banned by a three-point government policy. This policy has been applied in operating the Export Trade Control Ordinance.

Investigations by The Yomiuri Shimbun have revealed to date that a considerable amount of items which can be regarded as arms, many in the form of barrels for howitzers and mortars, have been shipped to the Korean firm.

The discussions between MITI officials from sections in charge of aircraft and arms, trade and export were held based on design drawings which Hotta Hagane handed to the two special steel manufacturers in ordering the "arms" from them.

The Aircraft and Arms Section has been taking the view that they were "semi-finished products" ever since it received an inquiry from the Kobe District Public Prosecutor's Office last December in regard to the exports.

This was based on the fact that the barrels had no rifling and they were about 10 centimeters longer than those used by Japan's self-defense forces.

However, they have learned that barrels for mortars usually have no rifling, which they said means that they have to carefully reexamine the matter.

Another Maker

Kanto Tokushu Seiko was the second after Sanyo Tokushuko to be found by The Yomiuri Shimbun to have manufactured the "arms" on orders from Hotta Hagane.

Kanto Tokushu Seiko, founded in 1936 and listed on the First Section of the Tokyo Stock Exchange, is Japan's top manufacturer of rolled forged steel.

The company is believed to have closed a contract with Hotta Hagane in the early part of 1977.

At the time, the products of Sanyo Tokushuko, which were reprocessed by another company, were not to the satisfaction of Dalkan Juki Kogyo, it was reported.

Hotta Hagane asked Kanto Tokushu Seiko to manufacture the "arms," which the company assumed on a full-scale basis, ranging from cutting to final inspections, including forging, in accordance with "military specifications" of the US Defense Department and supplied by Dalkan Juki Kogyo.

However, Katsushiro Yamamoto, managing director of Kanto Tokushu Seiko, said the company had no knowledge about the usage of what it had manufactured.

"If we had known that they were gun barrels, we of course would not assume the work," Yamamoto remarked.

A total of about 3,000 items, mostly comprising barrels for howitzers and mortars and "parts for arms" were allegedly shipped to South Korea between June 1976 and 1979 via Hotta Hagane, investigations by The Yomiuri Shimbun showed.

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ECONOMY

UNDERCURRENTS OF AUTOMAKER WAR EXAMINED

Tokyo MAINICHI DAILY NEWS in English 1, 3 Jan 81

[Two-part article by Takao Oshiyama: "World Car War - Why, How, What"]

[1 Jan 81, p 5]

[Text] The occasional newsbreak of tie-ups between automakers is indicative of the effusive undercurrents flowing every which way in the automotive industry throughout the world.

The Dec. 3 announcement by Nissan Motor Co. and Volkswagenwerk A.G. of West Germany and the announcement between Regie Renault and VW are just two examples.

More recently, Renault increased its equity stake in the fourth largest American automaker American Motors Corp. (AMC), the manufacturer of the Jeep, to 46.4 percent, ostensibly to help bail out the struggling automaker, becoming the single largest shareholder of AMC and acquiring controlling power. The state-run French automaker will have AMC produce Renault-developed subcompact cars in the United States and Mexico.

Economic viability is one of the key factors Renault has been pursuing in its American operation expansion program. Renault for years has been experiencing sales cycles of boomlet and bust on the very lucrative U.S. market due to unstable sales and after-sales activities.

Another key factor of the Renault move was to secure solid access to automotive electronic developments where Europe lags considerably behind the U.S. and Japan. Electronic components such as microprocessors and sensors are, at the moment, too expensive to be incorporated in popular budget cars. But these electronic "black boxes" have been determined to be vital components within a few years.

The Paris-based automotive company aims at catching up rapidly with electronic developments in the U.S., possibly also at leapfrogging the frontrunners through its participation in AMC. For instance, the noted American electronics manufacturer, Fairchild, was recently taken over by a French conglomerate.

Threat From GM

Like any other automaker around the world, Renault feels like David challenging Goliath, as the world's largest automaker, General Motors Corp. (GM), has announced that it will introduce small passenger cars to major markets around the world, starting in 1983. GM's model codenamed the S-car is a front-

wheel drive passenger car mounted with a 1-liter engine.

The S-car project has made the other automakers apprehensive and caused them to go into a huddle over GM for their survival.

With the S-car project, GM is entering headlong into the traditional field of European and Japanese automakers—small car production—cars whose engines range from a little less than 1 liter to about 2 liters.

With an abundant supply of cheap gasoline on the U.S. market, the American automakers had no appetite for turning out small, fuel-efficient motor vehicles until just a few years ago. But the successive oil price markups by the Organization of Petroleum Exporting Countries (OPEC) altered the traditional American love affair with the gas-guzzlers. "Small is beautiful" is catching on fast.

The American automakers are grudgingly following the change in consumer preference. Small car production, however, requires as much money and manpower as large cars but only fetches a portion of the profit a large car would make.

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Roughly speaking, a car that is twice as large in piston displacement commands four times the profit of a small car, so it is not surprising that American automakers ignored the small cars.

The situation was and is quite different in Europe and Japan, where gasoline prices have been substantially higher than in the U.S. ever since the invention of the automobile at the turn of the century. Gasoline availability has been much less abundant, roads are much narrower and winding, while personal income has been less than in the U.S. These are the factors that have been dictating that European and Japanese automakers produce small, economical autos. The OPEC markups further anted up these requirements.

In a sense, European and Japanese automakers have more expertise and experience in manufacturing small, fuel-efficient cars than the American Big Three—GM, Ford and Chrysler. Non-American automakers could easily counter the Detroit challenge provided that European and Japanese small-car specialists are as large as the challengers in terms of sales, profits, research and development investments, and so on.

Big 3's Strength

Some European and Japanese automakers are rather close to the Big Three in terms of annual production volume but otherwise they are no match. Here is the real strength of the American Big Three.

The American Big Three's strength also lies in their extensive overseas operations except for Chrysler. The automaker shedded most of its foreign operations when its

financial crisis surfaced a few years back. Its European operation was sold to Peugeot-Citroen to become Talbot, the Brazilian operation to Volkswagenwerk to become Volkswagen do Brasil, and the Australian operation to Mitsubishi Motors Corp. to become Mitsubishi Motors Australia.

GM and Ford are operating a sizable number of subsidiaries. In Europe, Ford has under the umbrella of Ford Europe Ford U.K. in the U.K., Fordwerk in West Germany and one in Spain. Similarly, GM has Vauxhall in the U.K., Opel in West Germany and one in Spain.

In the Asia-Pacific region, the other stronghold, Ford has Ford Australia and GM has GM- Holden also in Australia. Ford has a 25 percent equity stake in Toyo Kogyo (Mazda) while GM has a 34 percent stake in Isuzu Motors in Japan. Chrysler, though in a crisis, holds fast onto its 15 percent interest in Mitsubishi Motors Corp.

Among European and Japanese automakers, VW and Daimler-Benz A.G. (BD) have the most extensive foreign operations. Nissan Motors Co. expanded its overseas operations last year. But these operations abroad, though being bolstered, are still considerably less extensive than the Americans'.

The Detroit-based automakers do not have much experience and expertise in the subcompact and smaller divisions on their home market. In actuality, however, they do have vast expertise and experience in making and selling these smaller autos through their European operations.

Made Outside US

Typical models are the Ford Fiesta and the Opel Kadett-Chevette-Isuzu Gemini of GM.

The Fiesta, being produced in the U.K., Germany and Spain, has an engine ranging from 950cc to 1600cc and was also sold in the U.S. for two years and is still being sold in Japan. Likewise, the Kadett, Chevette and Gemini are being produced in Germany, the U.K. and Japan, respectively. Though the names are different, these cars are essentially the same single model.

Then, why are the American automakers taking so long in rolling out made-in-USA thrift subcompacts?

A part of the answer is that the development of a brandnew car from scratch takes about four years. Another part of the answer is that the Big Three misread American preference changes from large, gas-guzzling but extremely comfortable cars to small, economical but not so comfortable cars. Yet, another part of the answer is the meager profitability of small cars, as mentioned earlier.

But the prime factor, though not acknowledged by Detroit, must be the costs needed to convert existing plants for small models and the accompanying retooling costs. The depreciation of these plants, equipment and tools is as weighty as the conversion costs.

In a nutshell, the American automakers dreamed and embraced a little too long the great American dream.

Counterattack

Now they are mustering up all the strength they have to leapfrog the European and Japanese automakers. GM has brought out the X-cars, Ford the Erika cars—Escort and Lynx, and Chrysler the K-cars.

GM, the behemoth, is to bring out the S-car in 1983. Chrysler is trying to bring out the L-car around 1984. Ford, besides joint venture talks with Toyota, is

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discussing with Toyo Kogyo a joint program to roll out a competitor to GM's S-car. The Ford model is believed to have a 1.1-1.3-liter engine. Likewise, other automakers are scrambling to introduce their own 1-liter cars around the time the S-car debuts.

The American trio plans to pour \$80 billion into R&D for future models between 1981 and 1985. Japan's largest and second largest Toyota and Nissan were to have invested \$1 billion and \$0.9 billion in R&D last year. Volkswagenwerk will invest \$7.7 billion between 1980 and 1983 while Fiat will spend \$6.4 billion by 1985 on new models and plant modernization. If the amount is any criterion of success, European and Japanese automakers would have to pool their resources in one way or another in order to survive.

These small car specialists anticipated the massive American offensive and made preliminary preparations accordingly: To look out for prospective partners and investigate them thoroughly—which began presumably about two to three years ago. The preparations began to take on concrete shape with such tie-ups, last year alone, as Nissan-VW, VW-Renault, Nissan-Alfa Romeo and Renault-Volvo, and a Fiat-Peugeot joint venture in electronically controlled engine development and a move to merge their Latin American operations.

Alliances

In 1979, Saab-Scania and Lancia, a Fiat subsidiary, formed a joint venture, and BL Ltd. and Honda Motor Co. agreed to jointly produce 85,000 Honda-developed cars in the U.K. annually, starting the middle of this year.

These alliances are only the tip of the iceberg. Japan's largest, Toyota, does not yet have significant foreign

production bases, except for Australia, indicating ample possibilities of entering into alliances with foreign automakers.

Toyota is currently negotiating with Ford on a possible production venture on small passenger cars and/or small commercial vehicles in the U.S. The next move would be to go to Europe itself or by proxy of one of the companies belonging to the Toyota group like Hino, a truck-bus specialist, or Daihatsu, a minicar specialist. Hino is already in Spain. Toyota is also negotiating with SEAT, a leading Spanish passenger car manufacturer, over capital participation.

Nissan declared, shortly after the tie-up with VW, that it has almost completed its overseas operations expansion for the time being.

Fuji Heavy Industries (Subaru), a member of the Nissan group, is supposed to take part in Nissan-VW projects. The automaker is known for its very unique engines and four-wheel drive technology as well as its minimotor vehicles.

Nissan Diesel, another Nissan group member specializing in trucks and buses, is expected to play a role in Nissan's Spanish operations—collaboration with Motor Iberica, a leading agricultural machinery manufacturer in Spain, in which Nissan has acquired a stake.

Mitsubishi Motors Corp. should be interested in forming an alliance with an European automaker to enhance its European business, although it is disturbed by the lingering crisis of Chrysler. MMC has the widest range of motor vehicles—from minis to large buses to gigantic offroad trucks—of any single Japanese automaker.

Although teamed up with Ford, Toyo Kogyo will not be comfortable as long as it is restricted to the one U.S. connection alone. In spite of their capital affiliation, Toyo Kogyo-Ford appear to have a love-hate relationship. Ford may try to swallow Toyo Kogyo in the future as former Ford chairman Henry Ford II remarked in Tokyo sometime back that the company wanted to have a 100 percent subsidiary in Japan. Moreover, Ford is also flirting with Toyota. Given the situation, Toyo Kogyo would seek the means to solidify its own stand against either event and a possible partner would have to be found in Europe, one of the three largest auto markets.

Isuzu Tie-Up

Isuzu Motors, which mainly produces trucks and buses and to some degree passenger cars, is an integral part of GM's worldwide operations. It will definitely play a greater role in the Asia/Pacific region as well as in Europe. In December, Isuzu's president visited Vauxhall and Opel for the first time in nearly 10 years for what was purported to be courtesy calls.

Would it be too far-fetched to suspect that the Kadett-Chevette-Gemini produces discussed, during the Isuzu visit, work divisions on the production of GM's S-car? The S-car is also to be produced in Spain, according to the GM announcement.

Isuzu, along with Toyota, Nissan, MMC, and Toyo Kogyo, is also producing and exporting a 1-ton pickup which no European automaker produces. Isuzu could augment GM's commercial vehicle operations in Europe with its Luv pickup.

Honda Motor Co., strongly independent-minded and operating extensive motorcycle plants here and there around

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the world, has started motor-cycle production in the United States. It is now building a passenger car plant in Ohio. It will also be on the partner-hunt bandwagon. Its prospective partner would have to be a European manufacturer. Honda is also to formalize a contract with Daimler-Benz's South African affiliate on the production of Honda-designed cars here this month. Honda's tie with BL is well-known.

Another leading manufacturer of motorcycles and minimotor vehicles, Suzuki Motor Co., the smallest in Japan, test-marketed its first 1-liter passenger cars in Europe

last year. Though the volume was limited, Suzuki's expertise in minivehicle production would not be insignificant in developing and manufacturing 1-liter or smaller vehicles. Ford was once reported to have approached Suzuki over the development of 1-liter-class passenger cars.

Yamaha Motor Co., another leading motorcycle manufacturer and a member of the Toyota group, has been touted to go into the specialized four-wheel business, as it has been supplying engines to Toyota. It has a tie with Fiat on engine technology.

[3 Jan 81, p 5]

[Text]

To the European eye, the Japanese appear to be Enemy No. 1 as they are producing identically-sized autos and eating into Europe's traditional home market as well as its backyard market of Africa.

The Japanese automakers, however, have at least one irresistible strong point--topnotch automotive electronics. Japanese automakers are enlisting the mighty help of highly-advanced electronic technology from such developer-manufacturers as Hitachi, Toshiba, NEC and Mitsubishi.

Automotive electronics are enabling the Japanese automakers to get more miles to the gallon discharging far less pollutants than before. Greater mileage is the driving force of fuel-efficient car development as long as gasoline and diesel oil remain the principal automotive fuels.

There appeared some possible substitute fuels on the horizon such as alcohol produced from land and sea

vegetation (giant kelp is a favorite) and synfuel, fuel derived from coal liquefaction.

But the widespread usage of these prospective substitutes are highly unlikely in this decade except in Brazil and certain areas in the U.S. where gasohol (alcohol-gasoline mixture) is receiving tax discounts and incentives.

Electricity has also been touted as a possible power source but its widespread use again will not materialize until a major breakthrough is made in reducing battery weight and bulk or in the development of remarkable fuel cells.

Vast Suppliers

Another important point Japan has is its vast suppliers of automotive components and its market itself. Except for a few such as VW, DB and Volvo, no European automaker has any substantial production facilities in the Asia/Pacific region, including Japan. Aside from VW, none of the European automakers has any noteworthy presence in Japan. Even VW hardly sells more

than 20,000 units in Japan a year through its faithful Japanese importer-distributor.

The advancement into Japan or other Asian countries by European automakers, single-handedly or in a tie-up with a Japanese firm, would enhance European auto sales in the Asia/Pacific region. The Americans have taken that step and are unfolding their operations with their Japanese partners.

Among the European automakers whose names have not been mentioned or mentioned fleetingly include such familiar but less well-known names as Alfa Romeo, Ferrari, Bavarian Motors Vek (BMW), Porsche, Rolls-Royce, Lotus, Citroen, Talbot, Austin, Morris, Daimler, Jaguar, Rover and Triumph. The last six constitute BL Ltd. Citroen and Talbot are under the control of Peugeot.

Economy Of Scale

Another important aspect of automobile manufacturing is the economy of scale or the numbers game. Automotive

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executives around the world unanimously agree that there is a level of annual production at a given plant that is the most economical. That level, they say, is about 240,000 units.

In other words, a 240,000-unit production is the bottom line for an automaker to qualify as a full-fledged member of the world automotive club. To be comfortable in the club requires a higher figure, and an alliance is the quickest way to attain multiples of 240,000 units.

An alliance leads to sharing increasingly standardized components, to increasing similarity in mechanical works and leaves styling and design as the distinguishing features of the partners.

Already, a lot of parts and components have been crossing the oceans and borders without fanfare. The same goes for technology. Two leading German automakers, for instance, have been quietly using Japanese-made components in their cars and a French automaker is getting emission-control technology from a certain Japanese automaker. There are also reverse flows.

The tie-up between Nissan and VW would be the Model T in these respects, too.

GM and Ford are trying to maximize the merits of common parts and components to their advantage, by sharing them with their subsidiaries and affiliates around the world to 1) minimize the per-unit cost, 2) offset the decreased per-unit profit with increased sales volume (a smaller car fetches less profit than a larger one), 3) shake out competitors as soon as possible, and 4) make their affiliates even more dependent on them.

'The World Car'

The cars conceived in this line have been dubbed "the world car" by GM and Ford. The archetype is GM's S-car. Now, it

is clear that Ford's Fiesta and GM's Kadett-Chevette-Gemini are the forerunners of the world car.

Thus, alliance-making has become a must for survival for most automakers. The other side of it is industry shakeout or reorganization, spelling out slow death to those who failed to get aboard the partner-hunt bus.

What distinguishes GM from other giants, including Ford, is that only GM could afford its downsizing programs, inclusive of the S-car project. No other automaker has ever done such a dare-devil stunt on its own. GM must have done so for many reasons, calculating the political, economic and psychological effects on governments, competitors, and motorists. For instance, to show off its strength, to scare others, and probably to justify the relatively high prices of its new small cars.

Shortly after the Nissan-VW tie-up news swept through the automotive industry in Japan, some candid executives revealed displeasure in a moderate yet distinctive manner in private meetings, indicating deep behind-the-scene maneuverings.

Leading indigenous European automakers like VW, DB, Renault are enjoying a larger profitability than Japan's top Toyota and Nissan do. But these European giants have been outstripped by the Japanese giants in output. And the name of the game is numbers. So the European automakers, like their Japanese counterparts, have to increase their output in one way or another against the Detroit giants.

American Demand

The aggregated American auto demand runs up to about 15-16 million units a year of which GM, Ford and Chrysler

supply about 10-11 million in a normal year. Whereas the Japanese demand is nearly 5 million and the European demand a little less than Japan's figure.

The above means that the ultimate size of an automaker is ultimately limited by the size of its home market. With a normal yearly output of nearly 6.5 million at its domestic production facilities, GM could more than satisfy the entire Japanese demand for a year.

Toyota's output in 1980 was estimated to be 3.3 million units. The automaker is aiming to have a capacity of 3.5 million. The gap between the world's largest and second largest is still too vast. The same goes for GM and other automakers, including Ford.

In view of this, even the very proud Frenchmen would have to give serious consideration to alliances. It would be hardly far-fetched to presume that Renault and Peugeot-Citroen-Talbot, the two auto groupings, are negotiating with foreign automakers, possibly with certain Japanese, on forming an alliance which would not hurt the prestige of France or that of French automakers.

Renault has been active in this respect, as it gained a 46.4 percent equity in AMC. Will it end its expansion there? What about Peugeot-Citroen-Talbot, Daimler-Benz, BMW, Volvo, and Saab-Scania?

Africa Market

Marketwise, Africa has traditionally been regarded as the backyard of Europe by European businessmen. Latin America has been also regarded as the backyard of North America by American businessmen. These businessmen regard that the fast-growing Southeast Asia region is viewed by Japanese businessmen as the backyard of

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Japan. Australia is an important production base but as a market it will continue to be rather small due to its sparse population.

But traditional world market divisions in the automotive field are being altered as automakers eat into one another's home and backyard. However, Southeast Asian auto demand is about to grow by leaps and bounds.

In addition, there is a vast almost untapped market in Asia—that is China. For the time being, Chinese auto demand will be severely restricted to trucks but the market will be huge all the same.

Generally speaking, the Chinese automotive industry is still at the stage where the then burgeoning Japanese auto industry was some 25-30 years back and producing presumably (figures are hard to come by) small numbers of 4- to 8-ton trucks, such as the Liberation, and passenger cars such as the Red Flag, which the upper echelon of the Chinese leadership uses, and the Shanghai for other officials, and taxis. Bicycles are the principal private means of transportation.

But to carry out its four modernization plans before the turn of the century, China definitely needs an incredibly large fleet of commercial vehicles, ones better than China can produce now. In spite of its great emphasis on resilience, China will not be able to achieve this feat unless it introduces foreign automotive technology and expertise.

The market is obviously too vast for any single foreign automaker to meet the Chinese demand single-handedly, and even if it were possible the shrewd Chinese government would never allow such a thing to happen in its territory.

To this potential and yet very real market, such automotive giants as GM, Ford, MMC, Toyota, Nissan, VW and DB have completed their initial approach. Although the market seems to be a few years off, the time span involved is well within the time scale of these business concerns.

China has already designated two of its provinces—Fujian (Fukien) and Guangdong (Kwangtung)—as the stages for economic experiments. The two provinces were granted a free hand in economic matters, including allowing joint ventures between Chinese and foreign capital.

This was confirmed on Dec. 13 when the Fujian provincial authorities and Hitachi, Ltd. concluded an agreement to set up the first joint venture under the new 1979 Chinese foreign investment law. The joint TV-manufacturing venture has already been set up on a 50-50 basis and even the stock has been issued. This signaled a radical departure from the old Chinese line and thus cleared the road for other joint ventures.

GM Eyes China

The seriousness of GM's approach to China was gleaned from a remark made in Tokyo by a GM executive vice president sometime ago. The executive said that China based its new foreign investment law on the draft GM presented when then GM Chairman Murphy made his first visit to China after the 1949 revolution.

It's well-known that Henry Ford II visited China shortly after Murphy, that German businessmen as a whole have been keenly interested in doing business in China, that France was one of the early countries which recognized the communist regime in Peking and has been on extremely friendly

terms. Fiat has much experience in doing business in the communist bloc for the Italian automaker provided technology and expertise to the Soviet Union and Poland. The fruits are the Soviet-made Lada and the Polskii Fiat.

Leading Japanese manufacturers of trucks and other commercial vehicles—Mitsubishi, Isuzu, Hino of the Toyota group, and Nissan Diesel of the Nissan group—share the great advantage of geographical proximity and well-established productivity and quality control.

SEA Advancement

For the European automakers, advancement into Southeast Asia would not only spell out immediate business expansion but would also enable them to get acquainted with the Oriental mind potential business opportunities in China.

In considering plausible new tie-ups, capital and otherwise, GM, Ford, Chrysler could be safely set aside. Suffice it to say that Chrysler is all out to stave off its own bankruptcy, while the other two have strong subsidiaries in key regions.

First of all, no automaker would dare tie up with any other automaker that could threaten its own independent existence. Otherwise the alliance would be self-defeating. This factor alone reduces many possible tie-ups to only a handful or so.

Thus, an alliance is only possible between equals as exemplified by the Nissan-VW tie-up. If capital tie-up is involved, this factor assumes even greater importance.

Product and market competition are as important as the above factor. The ideal is that one partner complements the other in each other's weak points such as product range or a particular market. The worst would be a clash of products and markets.

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Prestige

Prestige is nearly as important. Since an automobile commands a very high brand of loyalty, no major maker would be willing to enter into an alliance that could tarnish its prestige even for a better survival outlook. But smaller automakers would have to take this risk. One way to avoid it would be to limit the tie-up to a particular aspect, say technology. So large-small relations would determine the tie-up scope.

Also involved is the prestige of the state in which the automaker has his base. No government will be magnanimous enough to allow a humiliating relationship unless there was an overriding merit or necessity. The automobile, as always, also carries an image of advanced technology both at home and abroad.

This partly explains why European countries are adamantly emphasizing the smallness of Japanese auto imports in terms of volume disproportionately. In fact, Japan exports a much larger number of autos to Europe than Europe does to Japan. But Europe has been exporting autos which carry a very much higher value to Japan than Japan does to Europe.

Back to the main theme, the problem of language also counts, especially when a tie-up involves large-scale personnel interchanges.

Another factor is whether the automaker seeking an alliance is a multinational corporation (MNC) or not. If it is, it can place its own interest before that of the state in which it headquarters and usually outwit state-imposed restrictions

without raising hell, even when a conflict of interest arises between the state and the MNC.

Other factors involved are all too obvious to note down. And it would also be too redundant to list plausible combinations here.

THE END

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PORT IN SEKINEHAMA CONSIDERED FOR NUCLEAR SHIP

Tokyo DAILY YOMIURI in English 3 Jan 81 p 2

[Text] Aomori—The Science and Technology Agency is considering a plan to construct a new home port for the nuclear-powered ship Mutsu at Sekinehama, Aomori-ken, which faces Tsugaru Strait, it was learned Wednesday.

The construction of the new port for the 8,300-ton nuclear ship comes in the face of strong opposition from a local fishery organization against the original plan of continued use of Ominato port in the inland Mutsu Strait as the home port for the ship.

The agency also considers that a new home port is necessary to accommodate another nuclear-powered ship it plans to construct in the future.

It also plans to construct a nuclear power research center in the peripheral area of the new home port.

Aomori prefectural authorities have not yet officially approved the agency's plan but it stands a chance of materializing because local fishermen said they would not raise any objection to a port on the coast of Tsugaru Strait.

Sekinehama is located on a beach about 10 kilometers in length from east to west. There are no inhabi-

tants along the beach, behind which is a wide expanse of wilderness about 20 meters above sea level.

The agency is planning to enter into negotiations with the prefectural and municipal authorities and the local fishermen's organization after it presents its new plan to them within this month at the earliest.

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MODEL PLANT TO GATHER URANIUM FROM OCEAN

Tokyo MAINICHI DAILY NEWS in English 25 Dec 80 p 5

[Text] TAKAMATSU, Kagawa--The government has officially decided to construct a model plant to collect uranium contained in the sea, at a former salt field in Nio Town, Mitoyogun, Kagawa Prefecture, it was learned here Wednesday.

Construction work on the plant, the first of its kind in the world, is to start in August next year, at a nearby site of the "Solar EXPO. Nio," which will begin March, 1981.

It is said that the rate of uranium contained in sea water is 0.003 ppm (or three tons of uranium in one billion tons of water). Gathering the marine uranium is to begin in August 1984, when the plant is scheduled for completion.

It will be built at the former salt farm which covers about 10,000 square meters in the town, and construction cost is estimated at some 2.4 billion yen, according to a plan. The budget allocation for fiscal 1981 is 370 million yen.

The plant, which is to be in operation for three or four years, is expected to produce 10 kilograms of uranium annually.

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ATOMIC POWER PROJECTS FAIL TO WIN GO-AHEAD

Tokyo DAILY YOMIURI in English 27 Dec 80 p 1

[Text] *An official advisory panel gave the go-ahead Friday for plans to locate power plants at 12 sites throughout the country with the combined output capacity at 4,440,000 kilowatts for fiscal 1980, ending March 1981 but no atomic power project won official approval.*

This brought the nation's new power development for the current fiscal year to 6,830,000 kilowatts or 31.5 percent of the targeted 21,000,000 kilowatts.

Of the 6,830,000 kilowatts endorsed so far, thermal power accounted for 4,110,000 kilowatts and hydroelectric power 2,520,000 kilowatts.

The target breaks down to 13,000,000 kilowatts for thermal, 5,000,000 kilowatts for atomic and 3,000,000 kilowatts for hydroelectric power.

The Electric Power Development Coordination Council, an advisory group to the prime minister, indicated it would signal a green light for planned construction of two atomic power stations by the end of the current fiscal year.

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COUNTRY SEEN MOVING INTO AUTOMATION ERA

Tokyo DAILY YOMIURI in English 26 Dec 80 p 5

[Text] As industry in Europe and now America too loses its innovative nerve, the ingenious Japanese are beginning to make increasingly risky (for them) leaps into the technological dark. Take Japan's ambitious six-year project to build the world's first fully automated factory for turning out small batches of engineering components—the basis of back-street engineering the world over. Government planners would like to think the experimental factory will be in operation by 1983. But, they nonchalantly admit, it could well be a \$60 million flop.

The important thing, either way, is that the 20 Japanese engineering firms collaborating on the project with the government's mechanical engineering research laboratory at the University of Tsukuba, the "science city" outside Tokyo, will steal a further huge productivity lead over their industrial competitors if they learn how to apply automation to small batch production.

The experimental factory due to be built at Tsukuba is designed to include forging and machine tools capable of turning out different metal parts at the flick of a switch. It will also use machinery for automatically assembling complicated products (ie, gearboxes or hydraulic valves) containing 30 to 50 parts. Why might such a project fail? Because two key features—developing really powerful lasers for machining the metal parts, and designing machines capable of doing all the fiddly assembly tasks—might not be ready in time.

Typical forging machines use one pair of dies to stamp out a single part from hot metal. These huge and expensive metal dies have to be replaced each time a different part has to be produced, wasting time and cluttering forging plants with large stacks of dies. To adapt forging to small batch production, the Japanese team has two tricks up its sleeve: one is to try to improve existing means of making parts by compressing hot metal powder; the other depends on developing a "universal die" capable of forming any shape from its own moving parts.

The Japanese are also trying to merge two machining jobs—milling and lathe cutting—into a single process that relies on a high powered laser to cut, weld and treat the parts. A team of companies including Mitsubishi Electric is trying to develop a 20-kilowatt carbon dioxide laser needed for the job. So far, it has produced only a five-kilowatt experimental model capable of welding plates five millimeters thick. Still, that is a significant improvement over existing commercial laser machine tools. The best currently on the market, from Italy and West Germany, use only 0.5 kilowatt lasers.

Another obstacle the Japanese team is trying to surmount is designing the specially dextrous robots needed for carrying out the final assembly. Dr Shotaro Ozaki of Tsukuba University reckons there is quite a chance of not completing the assembly machine in time for use in the pilot factory. Instead of using the familiar single-arm robots that are becoming common in car factories, the experimental assembly machine will have a number of computer-controlled pin-cers, suspended from a rectangular frame, which will wield all the tools needed for holding and attaching the parts.

Dr Ozaki estimates that, if the current experiments are successful, at least 10 fully automated factories could follow quite quickly, manufacturing all manner of bits and pieces with barely a human in sight. The researchers admit that

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the chances of licking all the technological problems are frankly only 50-50 at best. But if they do, the pay-off in the crucial (but notoriously labor-intensive) jobbing sector of the engineering industry could be immense. And that's a prize the Japanese believe is well worth a \$80 million flutter.

The Economist

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1980 'BAD YEAR' FOR STEEL INDUSTRY

Tokyo DAILY YOMIURI in English 21 Dec 80 p 4

[Text] Hard hit by lingering international imbroglios, Japanese steel mills are winding up their worst year in five years.

The industry's export shipments in all of 1980 are expected to fall below 30 million tons for the first time since 1975, according to industry figures available thus far.

The Japan Iron and Steel Exporters Association is forecasting exports at 29.6 million to 29.9 million tons for the year, compared with 31.496,000 tons in 1979 and the peak 1978 level of 37,040,000 tons. Association officials blame the fall on a number of factors basically beyond control of Japanese producers.

Among them were the economic slowdown in the US, the largest export market for Japanese steel and other products, and the suspension of the US trigger price mechanism.

The trigger, which was instituted in 1977 to protect the American steel industry, was suspended in March after US Steel Corporation filed dumping complaints against seven West European countries.

The No 1 American steel mill later withdrew its petition and the system was re-instituted, effective October 21, but the absence of the pricing scheme seriously disturbed Japanese shipments.

Japan's exports of all types of steel to the US this year are estimated at below 5 million tons, compared with 6,198,000 tons the previous year.

Western economic sanctions against the Soviet Union and Iran and, more recently, the flare-up of the Iraq-Iran war also scuttled the steelmakers' efforts to bolster their sales abroad.

Because these adverse factors remain unsettled and amid other looming discouraging signs such as growing competition from South Korea and beleaguered European mills, steelmakers and trading companies are sounding a pessimistic note on prospects for the first quarter of the coming year and beyond.

Steel mill and trading company executives dismiss chances of foreign demand picking up strongly and quickly or the international situation changing greatly for the next several months at least.

Prompted by growing

stockpiles of unsold products and a feeling of urgency to bring supply and demand into better shape, steel mills are cutting back drastically on production.

Although exact figures are not yet available, the producers appear trying to hold their combined output in the January-March quarter at around 24 million tons in terms of crude steel.

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JAPANESE STEEL INDUSTRY EXPECTS POOR NEW YEAR

Tokyo DAILY YOMIURI in English 23 Dec 80 p 5

[Text] Japanese steelmakers are at last suffering the problems which beset their counterparts in America and Europe earlier this year. And next year looks like being much worse than the industry had expected. Sales are already down—3 percent below year-ago figures in the three months to September, 7 percent down in the fourth quarter of 1980. But the real shock is a 15 percent drop forecast for the first three months of 1981. This would be the heaviest slump since the first oil crisis.

Then, Japanese steel firms, addicted to volume, waged a fierce price-war in export markets in Europe and America. Protectionist resentment led to steel trade barriers which helped convince the Japanese that, in the face of the West's steel crisis, profits could be salvaged only by restructuring, not by expanding exports.

That lesson has been learned—but slumping domestic demand will make it a painful one. The big steel firms blame their fall in orders on fat consumers' stocks, piled up when demand was high early this year: poor exports, forecast by the exporters' association to fall in fiscal 1980 below 30 million tons for the first time since 1975 (thanks to

low demand in America and political woes everywhere else from Russia to Iran); and recession in Japan's construction industry.

Construction takes half of Japan's domestic demand, twice the share of construction in the steel markets of other leading industrial countries. While flagging car production led the recession in steel in America and Europe, Japan's booming car industry, biggest in the world this year, has failed to cushion steel firms against falling demand because the motor industry buys a smaller share of steel production—less than 20 percent—in Japan than in Europe or the US.

But demand from shipbuilders, 5 percent plus of home consumption, is well up as Japanese yards meet the rush of new orders won in early 1980. Government spending on roads, railways, etc, worth 23 percent of domestic steel sales in fiscal 1979, is expected to pick up again early in 1980.

Lower sales will hit profits: Nippon Steel estimates roughly that profits in the second half-year to March 1981, will be only half of their buoyant level in April-September, when companies made big exchange gains. But Japanese steel firms are cash-rich: Nippon Steel is paying for "nearly 100 percent" of investment from its

own pocket. Total investment is smaller too, falling from the previous year's levels every year (bar 1978) since 1975, although this year investment in equipment for special steels,

where output is nearly three times higher than five years ago, is forecast to rise by almost 80 percent over last year.

Steelmen say no more mammoth mills will be built from scratch. Instead, they are tinkering with small improvements. Nippon Kokan's Ohgishima plant in Tokyo Bay, which was finished in 1979, will be the last such grandiose project in Japan. Already, the company is revamping it to raise the proportion of output which is continuously cast. It will reach 100 percent in a few years time. This summer the two 3-million-ton-per-year blast furnaces, built to burn heavy oil, were converted to use coke and tar.

Plant managers across Japan are now wondering how to recycle the heat from casting machines. Second-hand heat from the plant's blast furnaces is already generating electricity: Nippon Steel estimates that 10-12 percent of all electricity used by Japan's steel industry comes from recycled energy.

The Economist

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FUTURISTIC RESEARCH PLANNED BY KOBE UNIVERSITY

Tokyo MAINICHI DAILY NEWS in English 21 Dec 80 p 10

[Text] KOBE — Kobe University has announced a plan to establish a full-scale research center of marine science, the nation's first of its kind, on Rokko Island now under construction in Kobe Port.

According to the university, it will take eight years to complete the center at a cost of about eight to 10 billion yen. Experts belonging to the departments of science, technology and agriculture will jointly pursue their studies at the center.

The center will consist of five divisions studying inland sea plants, inland sea environment, outer sea, ocean research and development, and techniques for oceanic development. The studies will be conducted on the Seto Inland Sea, the Japan Sea, the Sea of Okhotsk, the East China Sea and the Pacific Ocean.

In the Inland Sea category ecological surveys, development of biomass energy and a comprehensive study of environmental pollution will be undertaken. In the marginal and outer oceans category studies will be made on earth magnetism, ocean currents, crustal movements, submarine deposit and extinct organisms to reveal the origin and evolution of the earth.

The ocean research and development division will deal with the study of the development of energy resources including the exploitation of manganese nodules and other submarine elements, wave power, current and temperature gap between sea surface and sea bottom which can be used for generating energy. The development of various machineries to survey oceanographic activities will also be handled at the center.

Simulators to study physical marine conditions by producing artificial waves and an environment of 10,000-meter-deep seabeds will be provided at the center for the first time in Japan. An information center on oceanic science which every researcher of Japan can use and the construction of 500- to 1,000-ton-class research vessels are also among the plans.

The marine science in Japan has been separately studied by the Institute of Oceanography of Tokyo University established in 1962, the Ministry of Agriculture and Forestry, the Ministry of International Trade and Industry, and the Ministry of Transport. Kobe University has already made great achievements in ecological research, survey of earth magnetism, submarine earthquakes and analysis of the pollution of the Osaka Bay.

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GOVERNMENT URGED TO PROMOTE LIFE SCIENCES

Tokyo DAILY YOMIURI in English 6 Jan 81 p 2

[Editorial: "Dawn of Life Science"]

[Text] Startling breakthroughs are occurring in life science with revolutionary implications for mankind, but unfortunately Japan lags far behind in this field. We need only consider recent reports of the achievements in life science. Most recently we learned that scientists at the University of Geneva produced from cells of a growing mouse embryo three mice with identical genetic characteristics as the embryo. This opens the way to clone higher mammals including man.

It is now possible to treat diabetes by means of insulin produced by genetic engineering, and a patent has been granted on recombinant DNA or gene splicing. Also, microbes which produce interferon, a drug capable of combating cancer, have been developed.

Breakthrough Like 'Explosion'

Any major scientific or technological breakthrough is accomplished on the basis of a huge accumulation of research results. But when it occurs, it is like an explosion or an earthquake caused by distortion in the earth's crust. In 1953, the double-helical structure of the gene was proven. And now less than 30 years later, a tremendous scientific advance has been achieved.

In the very near future, life science can be expected to make further progress and be established as an industrial technology. Biological substances, such as hormones and enzymes, will be mass-produced by recombinant DNA. Biological reaction furnaces requiring very high temperatures and pressures to produce chemical reactions will not be needed. This will be achieved by enzymes and microbes under normal conditions.

Governments and business corporations in a number of countries are becoming very interested in this technology. In the US, where this technology is the most advanced, many companies already have entered the field and have achieved practical results. The US

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Government is subsidizing these efforts. In Europe, several countries have pooled resources to establish a research institute on molecular biology.

Although there have been voices raised to promote life science in this country, unfortunately Japan is far behind in this field. Of 24 applications for patents in Japan in genetic engineering, 19 are from Western countries. This field is being taken over by Western nations.

Government Must Act Quickly

The government must do something to promote life science in this country and quickly. And for progress to be made, there is a need for cooperation among the fields of science including biology, agricultural science, physics, chemistry and engineering. Such cooperation is rare in Japan.

Therefore, the government must select pertinent areas of study, clarify goals for development effort, mobilize researchers, invest funds and create a setup that will enable organized and intensive study.

But caution must be practiced too. Life science concerns human life, and there must be safeguards against research threatening either the health or the sanctity of life. Scientists must practice self-discipline and the government must establish regulations to prevent abuse.

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MINISTRY SUGGESTS SEA-BASED POWER PLANTS

Tokyo DAILY YOMIURI in English 6 Jan 81 p 4

[Text] *The Transport Ministry is working on a plan to open "floating coal energy centers" for the dual purpose of using coal for electric power generation and making a better use of ocean areas in the days of energy shortage and the 200-mile economic water zones.*

Under the plan, a semi-circular breakwater would be built in an ocean area dozens of kilometers off the shore and a floating power plant constructed inside the breakwater.

The cinders of coal used to generate power would be used to reclaim land from the sea.

An offshore man-made island would thus emerge in the ocean area and by building a number of such islands in the same area, it would be possible to create "an inland sea" where the waves are calm and fish of various kinds can be cultivated.

The Transport Ministry will choose sites for the "floating coal energy centers" in ocean areas where the depth of water is between 20 and 50 meters.

The ministry said that the ocean areas extending from Ibaraki-ken to the Kujukuri-hama Beach in Chiba-ken and those extending from Cape Omaezaki in Shizuoka-ken to Wakayama-ken would be the most suitable sites.

These areas are relatively close to Tokyo and Osaka where large volumes of electric power are consumed.

The ministry said that as the first step toward the execution of the plan it would build a model power plant, about one-tenth or one-fifteenth the size of a fullscale power plant, in the next three years.

The model will serve as the prototype of a full-scale power plant to be built in the "floating coal energy centers."

The ministry is having the Ocean Development Council of the Federation of Economic Organization (Keldanren) work out the details of the plan. The council will present its final report on the plan to the ministry in March.

Each man-made island to be built would have a pier where coal freighters of 10,000 deadweight tons could be berthed.

The cost of building one "floating coal energy center," which embraces a man-made island, is estimated at about ¥700 billion.

When 100 tons of coal is burnt, 20 tons of cinders

are produced. It is normally difficult to find a place where the cinders can be dumped. By using the cinders to build a man-made island, the ministry would thus solve the problem of how to dispose them.

However, there are some problems involved in the execution of the ministry's plan. Although the Keldanren is supporting the plan, electric power companies have not yet shown interest in it.

The Transport Ministry will seek the cooperation of the International Trade and Industry Ministry (MITI) in persuading the companies to back the plan and in solving various other problems involved.

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SHIPYARD FAMOUS FOR MULTIPURPOSE SPECIAL VESSELS

Tokyo MAINICHI DAILY NEWS in English 3 Jan 81 p 5

[Article by Yutaka-Furutani]

[Text] There is a shipbuilding company on Awaji Island, Hyogo Prefecture, which is not well known in Japan but is world-famous for its construction of a variety of multipurpose specialized vessels with its unique technical innovations.

It is Teraoka Shipyard Co., Ltd. whose products are exported 100 percent to the United States, United Kingdom, Norway, Yugoslavia and the Middle and Far East. Among the products are LNG-freezing vessels, molten-sulfur carriers, well stimulating vessels, tug and utility boats, and those for overseas container roll-on and roll-off systems and for oil rig tugging service.

I visited the company in late December to learn why and how this small shipyard company has been incredibly prosperous at a time when shipbuilding industrial circles are being hit by recession as a whole.

"Though in a small way, our company, striving at all times for technical innovation, has built more than 200 multipurpose special ships with additional value through bold decision and action," declared President Yoshikazu Teraoka 66 of the Teraoka Shipyard Co.

Among the recent feature products of the company are a multipurpose transport vessel

to be utilized for exploiting the sea-bottom oil field of the North Sea off the U.K., and an energy-saving specialized vessel in which various types of crude oil can be blended freely. The latter will be utilized at an oil field in Brunei in Southeast Asia early in 1981.

Own Techniques

Teraoka was originally a skilled engineer in the field of submarine boat construction which needs the most advanced technology in shipbuilding. His subordinates have developed their own techniques in constructing these ships, the foremost in the world, after having stayed in the United States and Europe for several months.

Among other representative ships constructed by the company are training ships for fisheries schools, in which equipment for five different fishing methods is installed, and training ships for medical treatment in which noise and vibration can be shut off.

The company was founded at Fukura, Nantan town, Mihara County, situated at the southwestern tip of Awaji Island, in November 1949, with the objective of activating the shipbuilding techniques that Teraoka learned at Kawasaki

Heavy Industries, Ltd. before and during the war. It started with wooden and wood-iron ships, but these were replaced by steel ships in 1956.

As the principal facilities, the company has a shipbuilding berth and repair dock which can be used for constructing 6,000 deadweight-ton class ships, 12 units of various types of cranes, five tugboats and a floating dock. Despite the fact that it employs only 130 workers and about 200 subcontractors, its annual output surpasses 3.5 billion yen.

Teraoka, who has been the permanent managing director of the Medium-Size Shipbuilders' Association of Japan since 1963, goes abroad frequently for business talks and for technological research, while foreign contractors and subcontractors stay at the company's dormitory almost all the year round to "super-vice" the ships they have ordered. (For them the Mainichi Daily News which the company subscribes to and the bilingual broadcasting of TV programs are the precious mass media providing information, according to Hiroshi Kitagawa, a member of the company's board of directors).

In February 1980, Teraoka Shipyard Co. was taken up in a

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TV program entitled "Inside Japan" aired by the BBC of Britain. Many foreign ship-building engineers visit the company situated on the island which can hardly be found in world atlases.

"Despite the fact that ship-building industry circles have not been prosperous recently, fortunately, we have already received orders for ships to be delivered at the end of 1982.

Whenever the circles suffer from a business depression, our company usually stays out of a slump," President Teraoka said with a grin.

"This is undoubtedly the time when we have to strive to utilize labor-saving and energy-saving methods in both our work and products in the way of promoting the modernization of ships. It is also clear that we should further develop human engineering," Teraoka stressed.

"It is our joy to carry happiness through our ships to as many people in the world as possible. In this respect, we always work hard to build the most secure, rational and efficient vessels," he concluded.

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SCIENCE AND TECHNOLOGY

SUN DRENCHED TOWN SITE OF SOLAR EXPOSITION

Tokyo MAINICHI DAILY NEWS in English 4 Jan 81 p 12

[Article by Yutaka Furutani]

[Text] A small town in Shikoku along the Seto Inland Sea will hold a three-year-long fair, the first of its kind in the world, named "Solar Expo. Nio," beginning Mar. 21, 1981.

The site of the exposition is in Nio Town, Mitoyo County, located at the northwestern tip of Kagawa Prefecture, the legendary land of "Urashima's casket."

The solar exposition is scheduled to continue for 33 to 36 months. From 1.2 to 2 million visitors are expected. An outstanding feature will be the world's first pilot plant to generate electricity with the utilization of solar heat, which is to be completed in the coming spring.

The event will be jointly sponsored by Nio Town; Nio Sunshine Scheme Promotion Association, directed by Hisao Miyake, 60, headman of Nio Town; and Kagawa Prefecture. It will be supported by the Ministry of International Trade and Industry (MITI).

Surrounded by mountains on three sides and facing the Sea of Hiuchi, the town with a population of only about 8,000 has a tall two-tone color (red and white) tower made of iron and steel, the nucleus of the solar heat power plant.

Sunshine Scheme

Construction of the power plant has been under way since 1978 as one of the national projects called the "Sunshine Scheme" which is designed to utilize solar heat as an energy source in the long run. Its cost is estimated at some 10 billion yen, and MITI has fully supported the construction work in both financing and technology.

The site is a former salt field covering about 50,000 square meters where, in addition to the power plant, the main pavilion called the "Solarium," grand plaza for various events, promenades, observation platform and other structures and facilities will be built.

Playing the most important role in the exposition will undoubtedly be the solar heat power plant, comprising two types of structures developed by the foremost techniques of the world.

One of them is for a sunshine condensing system using a 69-meter-tall tower with a total of 807 plane mirrors, each of four square meters, fixed around the tower. The other is for a sunshine condenser system by curved surfaces with a combination of a total 2,480 plane mirrors, each three meters long

and 1.5 meters wide, installed in six rows.

The capacity of electric power generation at the plant will be some 2,000 kilowatts. More than half of the electricity demand at Nio Town will be covered by this plant after its operation starts in August.

Nio Town had long been known for its rich production of oranges and sun-dried salt. Although the area is still endowed with the best quality oranges, which are shipped to major cities in western Japan, the operation of the salt fields was abolished about 10 years ago due to change of the salt manufacturing method.

While Town Headman Miyake was thinking of reclamation work on the salt farm for the purpose of inviting some factories, he happened to learn of the government's plan of constructing a pilot plant to utilize solar heat for electric power generation. Miyake then strived hard, going to Tokyo frequently, to invite the plant to his town.

He finally defeated several candidates in a race to invite the plant, the first of its kind in Japan. In addition, he succeeded in inviting to his town a model plant to collect uranium contained in the sea, which will be built by the government, also for the first time in Japan.

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What's more, it has been practically decided that the government will construct another pilot plant to utilize solar heat to generate 10,000-kilowatt class electricity in Nio Town a few years later, according to Town Headman Miyake.

"We are proud of the fact that our town is becoming a center of the most advanced tests on how to utilize clean energy resources. No one would oppose the projects since no public hazards are brought about," stressed Miyake, who is in high spirit in striving to enable his town to prosper by promoting sightseeing on the basis of the solar exposition.

Sunniest Town

It has been known that Kagawa Prefecture has the most sunny days throughout the country every year. That is one of the reasons why the prefecture had long been noted for its sun-dried salt manufacturing on its natural salt farms.

Among the several places which were first considered as sites for solar heat power plant construction, only Nio Town was found to meet all of the 12 factors necessary for solar heat power plant operation, the town headman said.

When the solar exposition project was first disclosed, some did not believe it, saying that people living in and around Nio Town have long been fond of engaging in preposterous talks, further pointing out that the area is known as the legendary land of "Urashima's casket."

Now, however, Headman Miyake is very glad of the fact that nearly 10,000 people including students and pupils

from various parts of the country have already visited the site of the exposition, despite the fact that the solar heat power plant has not yet been completed. Among them were foreign scientists taken

there by MITI officials.

A publicity campaign for the exposition has already started, and sales of advance tickets began at the end of last November. (Admission will be 800 yen for adults, 700 yen for junior and senior high school students, and 500 yen for primary school pupils.) It seems that the sponsors of the exposition will not have too much difficulty in attracting more than 1.2 million visitors to the site.

Their estimate of the number of visitors is based on the fact that the "Setouchi 2001 Grand Fair" in Okayama held in spring 1979 received more than 1.3 million visitors during its three-month period.

"Even though the town is situated on an island (Shikoku), the exposition period is more than three times longer than that of the fair in Okayama," officials of the town office said.

In regard to Portopia '81, which will begin at about the same time as the "Solar Expo. Nio," Miyake said, "during the first-year period, we estimate the visitors to be mainly from various areas in the Shikoku district. After that we hope those from Honshu and Kyushu districts will visit our town to observe and study the exposition and the solar heat power plant."

"It is true that our exposition is small in scale, but it is aimed at making the visitors take back something substantial," the town headman declared.

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SCIENCE AND TECHNOLOGY

WATER EXPORT TO MIDEAST PLANNED

Tokyo MAINICHI DAILY NEWS in English 6 Jan 81 p 5

[Text] SHIZUOKA—Shizuoka Prefecture plans to export drinking water to Middle Eastern countries and seeks their petro-dollars to finance reconstruction projects in the event a major anticipated earthquake hits the prefecture and other parts of central Japan.

Local government officials say they can load oil tankers bound for the Persian Gulf area with water from a river at the foot of Mt. Fuji.

"We have a constant and quantitative supply of water—1.3 million tons a day—from the river and the water tastes nice," the officials said.

They put the water in bottles and carried it aboard an oil tanker to the Middle East last summer.

"After a 40-day round-trip between Japan and the Gulf region, the water was still drinkable and tasty," the officials said.

They have been working on the plan since early last year when Gov. Keizaburo Yamamoto made it public.

Exporting drinking water to the oil producing countries is not, however, without problems.

It will cost the local government, the officials said, about 10 billion yen (\$30 million) to build facilities to berth oil tankers at a local port.

The law also bans taking river water for private interests, calling it public property.

Exporting water in anticipation of financing an earthquake relief fund might be regarded as constituting private interests, the officials said.

"We have been also wondering," they went on, "if the Gulf countries are interested in our enterprise."

In addition, they said a constant supply of water must be secured in the years to come once exporting of water starts.

"The river could dry up and force us to stop shipping water," the officials added.

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SCIENCE AND TECHNOLOGY

DESERT RAIN SCHEME UNDER STUDY

Tokyo MAINICHI DAILY NEWS in English 7 Jan 81 p 5

[Text] A Japanese company is trying to obtain backing from an oil-producing Middle East nation for its scheme to create rain in the desert, using a giant tent.

The company is the Osaka-based Taiyo Kogyo, which is well-known in Japan for its recreational tents, and for such giant tent-like structures as the 140-meter long American pavilion at EXPO'70.

Under the direction of the chairman, Ryotaro Nomura, a research team of seven scientists and technicians have spent one year trying to devise a method of creating rain in the parched desert regions of the world.

The plan they have come up with involves the construction of a tent 10 kilometers long, 1.2 kilometers wide, and 600 meters high. This would simulate a mountain range.

The theory is that when damp sea winds hit a mountain range, rain is caused. This is because water vapor in the winds is forced into the upper sky, where the lower atmospheric pressure causes clouds to form, leading to rain.

But in the desert, downdrafts come from the upper sky, scattering water vapor before it

can rise high enough to form clouds.

It is thought that a man-made "mountain range" will cause updrafts.

According to Nomura, the research has been checked through a computer simulation. But there are no places in Japan suitable for an actual experiment, using, perhaps, a scaled down model tent.

"A coastal area would be best," he said. "There should be a lot of moisture in the air, and the wind must come from the sea."

"Also, we think the land should be as flat as possible."

"According to our research, a black structure will create the most uplift," Nomura said.

"The most suitable fabric would be teflon-coated fiberglass, which would last for 20 years. Stainless steel membrane would last 50 years, but is less flexible."

"It will be expensive, but the benefits will surely be 10 times the cost. We can create a new civilization."

The company has no means of ascertaining the cost of such a project. One Japanese newspaper quoted a figure of 1,000 billion yen, which Nomura agrees is not impossible.

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SCIENCE AND TECHNOLOGY

TOTAL QUALITY CONTROL IS THE WORKING RULE IN JAPAN

Tokyo ASAHI EVENING NEWS in English 7 Jan 81 p 6

[Text]

TQC—Abbreviation of total quality control. In a word, it is a company-wide campaign for improvement of product quality and corporate structure in all aspects from development of products to sales and services. The goal is to revolutionize basic attitudes toward management through the expansion of work patterns that rely solely on experience, the sixth sense and guts. At any rate, it's enjoying a great boom.

Companies introducing TQC have spread fast from manufacturing industries to distribution and service industries, while fact-finding missions are arriving from abroad in rapid succession to take a firsthand look at Japan's TQC drive. What is this TQC that has gripped the Japanese economy like a fever? First, let us observe the activities of small QC circles—the "grass roots" of the TQC movement.

The 10-story Kanzanji Royal Hotel at the Kanzanji Spa on the east shore of Lake Hamana has a total of 105 guest rooms capable of accommodating 520 guests. Its famed attraction is Atsu-Atsu Tempura (tempura hot from the frying pan).

The hotel's QC section is less than two years old. It all started when a training course was held for employees while the hotel was closed briefly in 1979 for reconstruction work. The 36 members of the kitchen staff embarked on serve a project to Atsu-Atsu Tempura. In the past, two men had spent four or five hours a day frying tempura in one kitchen and the tempura grew cold before being served.

First, jobs differences in the small kitchen were eliminated. Personnel capable of frying tempura were increased to over 20. All employees joined in various other tasks

immediately upon finishing the tempura, such as clearing and washing dishes. The detailed schedule for the staff was determined by the starting time of each banquet. As soon as the tempura was cooked waitresses quickly served it.

The creation of this attraction cost the hotel only the purchase of eight new frying pans—less than ¥10,000.

Microcomputer

On Nov. 28 last year, an annual meeting to announce the results of small group activities was held at the head office of Kao Soap Co. in Tokyo. Among those present, the general affairs section group of the Osaka Office attracted particular attention. This section's job was the operation of computer terminals. Three girls ranging in age up to 20 completed a microcomputer program for the buying commuter tickets

for all employees with the assistance of the head office's Systems Development Division.

Formerly, the purchase of commuter tickets for employees used to require massive, tedious paperwork—confirmation of commuting routes, preparation of applications to each system of transport, submission of applications to the Japan Travel Bureau, calculation of tax or tax exemption for each employee, etc. The general affairs section had to spend as long as 83 hours in processing applications for these passes which were simultaneously filed by about 200 employees of the Osaka Office twice a year. But the microcomputer, fed with all necessary information in advance

according to the program developed by the three girls, shortened the time to only seven hours.

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Design data

Late last November, the year's 25th and last "top-level diagnosis" meeting was held at the head office of Kajima Corporation, a leading construction firm, in Tokyo. The subject was the company-wide movement for TQC. A young leader of a QC group at the Building Design Headquarters proudly reported: "In the past, it took three hours and a half to confirm whether certain design data were available within the company and another two hours and a half to obtain the data after they were confirmed to be available. That is, six hours were needed altogether. But now we can do all this in only five minutes."

This group, which embarked on the utilization of design data, made out a classified table of such data and entered it into a computer. "This has boosted our firm's designing efficiency 10 times," the worker reported.

During 15 years of "high growth" in the Japanese economy, Kajima's business increased as much as 30 times. When Rokuro Ishikawa assumed its presidency, the firm was troubled with a decline in business shares and stagnant profits amid a general recession in the wake of the first oil shock. "Kajima is now in a state of self-complacency about its No. 1 position in the nation's construction industry. Unless we undertake a qualitative change, Kajima's history spanning 140 years would be wrecked." Driven by such a sense of crisis, Ishikawa buckled down to the TQC project in earnest. The construction industry was late in introducing TQC. Kajima's rival Takenaka Komuten had already adopted TQC in 1976 and was starting to make marked progress.

To introduce TQC, the TQC promotion office was immediately set up within the company, and the public information office was directly attached to the president in order to support the promotion office's educational ac-

tivity. For the company-wide enforcement of TQC, the unified committee for the promotion of TQC was organized with President Ishikawa himself assuming the chairmanship. At the same time, 25 TQC promotion committees were set up for each division and branch offices.

TQC education was first conducted for top management, then heads of departments and sections, and finally, employees in general. The joint training course for junior leaders was held daily for five days from 8:30 a.m. to 5 p.m. The following discussion group lasted into midnight.

Now three years after the introduction of TQC, Kajima has a total of 1,551 QC groups. Altogether, 1,758 themes for improvement have been studied, 640 have been applied successfully.

The steel industry as a whole has been pushing the "coluntary control campaign"—a unique form of TQC—for 10 years now. As part of this drive, the Japan Iron and Steel Federation annually sends an overseas study team made up of persons selected from member firms in recognition of their remarkable contribution to this TQC movement. The team sent abroad in 1979 consisted of 23 members, which included work squad chiefs and foremen chosen from 16 major blast-furnace steelmakers and specialty steel makers.

Takashi Sakurai, 42, work squad chief of the Wakayama Works of Sumitomo Metal Industries, Ltd., was one of them. The control technology section to which he belongs has a staff of 220 engaged in the control and repair of measuring instruments and computers at the steel mill. Under the mill's "voluntary control campaign" policy, the staff members have been divided into 68 teams. At the start of each year, all the teams put up their targets and mutually mobilize their ingenuity for labor and energy saving in

each process of production.

In 1979, Sakurai's section as a whole carried out an improvement campaign jointly with teams of other sections. As a result, the volume of high-temperature steam, used for warming liquid at the plating plant, was reduced by as much as 60 percent through varied innovations, including the use of measuring equipment, which had previously lain idle in a warehouse.

QC application

The idea of QC was at first disseminated in the manufacturing industries. But moves to apply it to service trades are now spreading, and a pioneer in this attempt is the Sanwa Bank.

In 1977, the bank launched a QC campaign as the basis for TQC. Since then, 2,400 such groups have been formed at the bank's offices throughout the country with a view to voluntary efforts for improving the quality of service to customers. Here is an example of a group which has received the bank president's

prize for remarkable achievement.

This group, consisting of seven female workers in charge of time deposits at the Wakayama Branch, made a remarkable showing in selling a new deposit plan called Pension-Type Deposits, started by the bank in February last year. The plan calls for depositing a certain amount regularly for a specific objective in the future. It has been a common practice among banks to put salesmen in charge of such new deposit plans. But the girls of Sanwa Bank's Wakayama Branch challenged this. They studied how to collect deposits through canvassing at the bank counter.

Until then, the seven girls had no knowledge of the techniques for collecting deposits. But through their steadfast efforts, they gradually acquired the necessary salesmanship — arousing the customer's interest by stressing the need to build educational funds for children and

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giving easy-to-understand explanations regarding the final yield on accumulated deposits. In only three months after they went into action, they collected a large amount of Pension-Type Deposits several times the sums gathered by other branches. This came as a total surprise for deposit-collecting veterans of the plant of Toshiba Corporation and the head office of Yokogawa Electric Works, Ltd.

UJSE is the mecca of TQC in Japan. It plays a leading role in promoting the QC movement and awards the Deming award to enterprises, which have scored marked QC results. The QC theory itself was imported from the U.S. after World War II.

But UJSE devotes itself mainly to techniques for QC specialists in production processes and other aspects. Scholars and experts cooperating with UJSE have totally modified the American-born QC into a system of management control and improvement campaigns based on the participation of all employees of companies, even including affiliated firms as well. This means the establishment of a company structure in which every section single-mindedly marches ahead toward its goal. Therefore, TQC should essentially be called a system that "was born and grew up in Japan."

A sense of family-type solidarity is vital for the effective enforcement of TQC. That is, each and every employee is required to be loyal to their company, and to devote even spare time to the QC movement. But such a thing is totally unthinkable in European and American businesses.

However, TQC is now spreading from Japan to other countries. Of late, foreigners have visited UJSE in quick succession for a firsthand study of TQC. In the first week of last December, for instance, it was visited by a five-member Chinese mission on scientific and industrial quality control on Dec. 3, an eight-member delegation of the Business Management Association in

Liaoning Province, China, on Dec. 4 and two representatives of General Electric of the U.S. on Dec. 8.

Meanwhile, a good many foreign enterprises have adopted TQC partially and experimentally. Among the principal firms are IBM, General Motors (GM), Westinghouse, Boeing and McDonnell Douglas of the U.S., Rolls-Royce of Britain and Volvo of Sweden.

Pentel Co., a leading maker of stationery, annually holds a general convention of QC groups on Oct. 1, the anniversary of the firm's founding. Last year's meeting was also attended by representatives from its overseas subsidiaries in the United States, Britain, West Germany and Taiwan.

Voluntary QC activities by small groups have now become a specialty of Japanese businesses. But there are few cases of expanding the system to overseas subsidiaries especially in Europe and the U.S. where workers move frequently from one firm to another.

The difficulty of the TQC movement lies in the maintenance of continuity and evolution. To remove such difficulty and keep enthusiasm for QC alive, the firm set up the goal of spreading the drive to overseas subsidiaries. President Yukio Horie concluded that TQC essentially means a company-wide campaign and therefore, should also be extended to overseas subsidiaries, which form part of Pentel's global operations. Immediately, heads of branch offices in various parts of the U.S. were summoned to Tokyo.

The firm succeeded in their "brainwashing" through intensive orientation. But as expected, American workers showed strong resistance to an attempt to organize "QC group" activities among employees. They said that "rationalization and improvement of work would lead to their dismissal" and that "employees who suggest good ideas for improvement should naturally be given profits accruing from it." The firm, therefore, tried to per-

suaide them to accept QC, explaining: "Three heads are better than one. Good ideas emerging from mutual enlightenment among workers will strengthen the competitiveness of our firm." In 1977, the overseas QC movement finally got under way with 30 percent of the foreign workers taking part.

Today, 20 QC teams are operating among 300 American workers, and by the end of last year, the ratio of those

participating in the campaign reached an estimated 85 percent. This is a really remarkable feat in the U.S. where workers consist of nine races, vary largely in educational level, do not meddle in others' work by doing nothing but what is indicated by work manuals and cannot be expected to show loyalty to the companies for which they work.

President Horie said: "Americans even sell the firms which they themselves have formed, without hesitation. This is unthinkable among the Japanese. But I realized herein lies the secret. It's money that counts." However, the money alone cannot elicit energy from individuals. The secret of success is to "flavor the monetary reward with a touch of honor," the firm says.

U.S. leaders' visit

President David Simpson and four other executives of Gould Inc., a major heavy electric machinery maker based in Illinois, visited the Union of Japanese Scientists and Engineers, Inc. (UJSE) on Dec. 1 last year. The following day, they heard a detailed explanation on the basic concept of TQC and actual examples of application in businesses from UJSE's staff, including general manager Junji Noguchi, followed by a question-and-answer session.

Pres. Simpson said: "I watched the program 'If Japan Can, Why Can't We...?' broadcast by NBC (one of the Big Three TV networks in the U.S.) last summer. On that occasion, I was deeply impressed with the role of TQC in the qualitative improvement of Japanese goods."

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He apparently thinks the secret of Japanese businesses' high productivity, good product quality and strong international competitiveness results from TQC. Gould is a big business with annual sales of over \$2 billion, and is included in the top 200 of American firms as published by the Fortune magazine. And the head of this firm made a busy round of visits to offices and plants where TQC is enforced, including the Zama plant of Nissan Motor Co., Totsuka plant of Hitachi, Ltd., Fukaya

bank. The girls' voluntary study thus proved that it is possible to collect massive deposits at the bank counter.

Such moves in Japan to introduce TQC even into service trades are also attracting attention abroad as a "very Japanese-type phenomenon."

Sapporo City's Transportation Bureau operates two subway lines, 680 buses and streetcars, and has as many as 2,800 persons on the payroll. Eleven years ago, the bureau started a QC movement ahead of the central government agencies and all other local government offices. The director of the bureau at that time recalls: "Compared with private bus service, the municipal bus system's cost per kilometer was high. Therefore, whenever the district land transport bureau announced a table of transport costs of various transport systems, we felt rather ashamed. While we were racking our brains to lower costs and elevate efficiency, we learned of a QC campaign in progress at the Muroran Works of Nippon Steel Corporation. I thought this was the very method we should adopt."

A total of 515 suggestions have since been made from the staff of the Transportation Bureau, and 257 of them have been adopted, producing various concrete results, such as improvement of work efficiency and safety. A case in point is the invention of a tester to locate the cause of trouble in money exchangers installed in "one-man buses."

The machines for automatically changing ¥1,000 notes and ¥100 coins tended to develop troubles, and five to 10 of these problems were reported daily. Since as many as 34 points of the machine had to be checked for detecting the cause of each trouble, it took as long as one hour and a half to correct a malfunction. Therefore, two young staff members got down to the task of simplifying the repair work and finally developed a machine for locating the cause of trouble at one glance. Today, the repair time has been cut to only 10 minutes, and the two men have been awarded a ¥10,000 prize.

In the case of Komatsu City, Ishikawa Prefecture, municipal office personnel were sent into Komatsu Ltd., a leading manufacturer of construction machines, to study its QC program. Today, the municipal office is visited frequently by assemblymen of various local governments throughout the country as a model of QC in local administration.

Administrative reform

Recently, the central government has started to pay attention to the QC campaign. Yasuhiro Nakasane, director-general of the Administrative Management Agency, said: "The world is keenly interested in QC and management control, which form the basis of Japan's great economic strength. Such merit of private enterprises should be introduced to improve Japan's bureaucracy as well."

In September last year, the agency commenced what may be called "administrative reform QC" modeled after the QC drive in the private sector. Among its goals are (1) abolition of outmoded laws, ordinances and regulations, (2) 20 percent reduction in about 10,000 cases of permission and licensing business conducted by government agencies, (3) consolidation of public corporations into fewer entities, (4) abolition or reorganization of as many as 212 deliberative councils in the Government and (5) sim-

plification of procedures for application to government agencies to speedup processing of business.

In the U.S., there is even a management consulting firm that gives QC guidance. Its name is Quality Control Circles Inc. President W.S. Rieker of the five-year-old firm studied TQC under Hajime Ishikawa, president of the Musashi Institute of Technology and professor emeritus at Tokyo University, who founded Japan's TQC drive, 10 years ago when he was chief of the missile and aeronautics manufacturing division of Lockheed.

After the war

Japan's QC was started on a full-scale basis after World War II by order of the U.S. occupation forces. The original aim was to improve the quality of goods supplied to the occupation forces. But under the guidance of W.E. Deming and J.M. Juran, both QC specialists of the U.S., who visited Japan successively, Japan's QC campaign made phenomenal progress, finally flowering into the Japanese-type TQC from around the mid-1960s.

Hajime Karatsu, managing director of Matsushita Communication Industrial Co., who was among Japan's first QC experts, said: "Analytical methods, such as cause and effect diagrams and Pareto diagrams, were taught to workers and meetings to announce of QC results were organized, triggering a sort of QC 'fever' among workers. It was like a new religion and once benefits were confirmed, it spread rapidly."

About the time when Japanese makers embarked upon fostering QC circles, the ZD (zero defects) movement, a still more intensive quality control drive, emerged in the U.S. and was also introduced into Japan. But this movement failed completely in the U.S. since defects of products were all blamed on workers. In Japan, too, small group activities affected by ZD incurred resistance.

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By contrast, Prof. Ishikawa repeatedly stressed the need to respect voluntariness in his lectures throughout the country, saying: "In the ZD movement, orders are given from above in the form of 'kick-off.' But this will not work. What is most important is for each employee to act of his own free will."

Whether or not workers act voluntarily is a decisive factor in the TQC movement. Therefore, some businesses take a dim view of the introduction of TQC under instructions from top management. Despite the TQC boom in Japan's banking circles, the Dai-ichi Kangyo Bank, the biggest commercial bank in Japan, remains cautious, saying: "we don't think it good to forcibly carry out such a campaign under the direction of our President. We want to respect a voluntary drive rising from the rank and file and therefore, we'll just wait."

Yasuo Noda, chief researcher of the bank's planning department, said: "If a TQC movement organized from above is carried out, it may prove a shot in the arm temporarily, but eventually, such a movement could invite resistance to the detriment of the corporate perpetuity."

Major trading houses are also taking a wait-and-see attitude to the TQC movement. "It's difficult to measure the productivity of white-collar workers, with a specific rule," said Naosuke Tsurumi, deputy director of the First Personnel Department of Mitsubishi Corporation. The firm is rather negative toward QC activity, mainly because the ability of each individual counts for much if the firm is to survive an intense competition for orders. "Waste is also an important factor in our business. It's also necessary to admit the good aspect of unreasonableness," he said possibly because of the firm's confidence in its global operations.

Be that as it may, the TQC drive is spreading like wildfire to the tertiary industry

—banks, insurance firms, hotels, restaurants, electric goods stores, municipal offices, etc. Already about 130,000 QC circles with a membership of about one million have registered at UJSE. If unregistered groups are included, several million workers have participated in the TQC campaign throughout Japan. "In 10 years' time, firms which don't join TQC may come to be considered rather strange," said Karatsu.

Will TQC, which has raised "made in Japan" products to the status of the best-quality goods in the world, also succeed in the tertiary industry, which consists mostly of white-collar workers? This after all seems to hinge on how far the TQC's slogan of "respect of voluntariness" and "respect of humanity" can be adhered to.

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Picture Captions

The inventor of a tester to locate the cause of trouble in money exchangers installed in "one-man buses" checks the trouble by means of a machine.

Workers at Wakayama Works of Sumitomo Metal Industries, Ltd. mobilize their ingenuity for labor and energy saving under the "voluntary control campaign" policy.

David Simpson, president, and four other executives of Gould Inc., a major heavy electric machinery maker of the U. S., hear a detailed explanation of the basic concept of TQC and examples of application in businesses from staff of the Union of Japanese Scientists and Engineers, Inc. (UJSE).

Three girls ranging in age up to 20, working at the Osaka office of Kao Soap Co., completed a microcomputer program for buying commuter tickets for all employees.

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SCIENCE AND TECHNOLOGY

BRIEFS

USSR VOLCANO STUDY REJECTED--The Foreign Ministry notified the Soviet Embassy in Tokyo Tuesday that it had decided to reject the Soviet request to send a boat to observe underwater volcanoes in Japan's fishing zone near Iwo Jima. The request, which asked Japan's permission for the Russian boat's 40-day activities at five spots near Iwo Jima, was handed to the Foreign Ministry last October by the embassy. All five spots are located inside Japan's 200-mile fishing zone. However, the Foreign Ministry, after consulting concerned ministries such as the Defense Agency and the Agriculture, Forestry and Fisheries Ministry, decided not to allow the Russian boat's entry into the area. The ministry explained that there are no clear reasons for the observation activities in the area, and that the Maritime Self-Defense Force is constructing a heliport on Iwo Jima. [Text] [Tokyo DAILY YOMIURI in English 8 Jan 81 p 1]

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